

Discussion of the Unrestricted Dose Criterion
in NRC's draft Final Rule (SECY-97-046A)

and Changes from the 1994 Proposed Rule Approach

Proposed rule:

A site would be considered suitable for unrestricted release if the residual radioactivity, that is distinguishable from background, would result in a radiation dose that does not exceed 15 mrem per year, and, in addition, that the residual radioactivity level has been reduced to levels that are as low as is reasonably achievable.

Further, the proposed rule stated that licensees would be required to demonstrate that residual radioactivity from the site would not cause the level of radioactivity in any groundwater that is a current or potential source of drinking water to exceed the limits in EPA's National primary drinking water regulations.

Draft Final Rule in SECY-97-046A

A site will be considered suitable for unrestricted release if the residual radioactivity, that is distinguishable from background, would result in a radiation dose that does not exceed 25 mrem per year, including that from groundwater sources of drinking water, and, in addition, that the residual radioactivity level has been reduced to levels that are as low as is reasonably achievable.

To summarize, the two major differences between the proposed and draft final rules are: 1) the value chosen for the dose criterion, and 2) not requiring a separate criteria for groundwater.

How the NRC Staff Reached the Conclusions it did in the draft Final Rule (SECY-97-046A)

- The staff evaluated the comments from members of the public on the 1994 proposed rule and found that many commenters objected to the use of 15 mrem as a dose criterion for unrestricted release. Some found the number to be too high and recommended a criterion that would be essentially zero, while others found it to be too low and recommended values as high as 100.
- The staff considered the alternatives presented in the public comments and reexamined the rationale of the proposed rule.
- The NRC's first fundamental principle in preparing both the proposed rule and the draft final rule, is that a dose criterion for decommissioned sources should be set low enough that it provides a sufficient margin of safety to assure that doses are unlikely to exceed 100 mrem/year when you take into account the possibility of an individual being exposed to multiple sources of man-made radiation. The 100 mrem/year value was selected because it is the public dose limit contained in NRC's regulations in 10 CFR Part 20, and has been recommended for use as a public limit by the National Council on Radiation Protection (NCRP) and the International Commission on Radiological Protection (ICRP).
- The second fundamental principle considered is that, having assured that the first principle is met, that doses will be further reduced to levels that are as low as is reasonably achievable.

- The NRC staff considered potential man-made sources that a person could be exposed to from a review of data in its final Generic Environmental Impact Statement, and in other published sources, and determined that it would be highly unlikely that a person receiving a dose from a decommissioned source would also receive exposures from other sources so that the cumulative dose would approach 100 mrem/year. Sources that a person may be exposed to may include being a full time resident on a decommissioned site or working full time in a decommissioned building. Other sources might include exposure from consumer products and other licensed facilities, each of which have been found to contribute only a few mrem/year.
- Based on its analysis, the NRC staff concluded that, on a generic basis, using a dose criterion that would represent 25% of the NRC public dose limit provides an ample and sufficient margin to assure that it would be unlikely that doses would exceed 100 mrem/year. This conclusion is consistent with recommendations made by the NCRP, the Chairman of the ICRP, and the NRC's Advisory Committee on Nuclear Waste.
- Following up on the second fundamental principle stated above, which is also recommended by the NCRP and ICRP, is that, in addition to complying with the 25 mrem dose standard, that licensees would also be required to evaluate whether further reductions to doses can be made to levels that are as low as is reasonably achievable. This analysis would compare the benefits obtained from further reduction in dose levels to the costs and risks resulting from that reduction. An example of risks that might occur from reducing dose levels include traffic accidents that could occur during transport of additional quantities of waste to achieve the lower doses.
- For the large majority of NRC licensees, this evaluation will result in returning sites to pre-existing background conditions because

the residual radioactive contamination is so low that it will be easily cleaned up or will decay quickly to low levels. For facilities where contamination of soils and/or structures exists, further reductions in residual levels below the 25 mrem dose standard may not be feasible, but the requirement to reduce doses to levels that are as low as is reasonably achievable will assure that the dose is reduced as appropriate.

- With regard to the need for a separate requirement for groundwater protection, such a requirement was included in the proposed rule, at the request of EPA. NRC requested public comment on the advisability of including this separate requirement in the final rule. This provision would have required that residual radioactivity could not result in levels of radioactivity in groundwater, that are a current or potential source of drinking water, exceeding the maximum contaminate levels specified in EPA's National Primary Drinking Water regulations contained in 40 CFR Part 141.
- In preparing the draft final rule, the NRC staff's evaluation of groundwater was guided by the fundamental public health protection principles noted earlier. Based on those principles, the 25 mrem dose standard limits the amount of radiation that a person can receive from all potential pathways to which they could be exposed if they live or work at a decommissioned facility. These pathways would include direct exposure to residual radioactivity on surfaces, eating food grown on the site, and drinking water obtained from groundwater sources on the site.

- The NRC staff agrees with the need to control exposures from drinking groundwater that is potentially contaminated and agrees that the environmental integrity of the nation's groundwater needs to be protected. Nevertheless the NRC staff has concluded that protection of public health and safety in the use of this valuable resource is achieved by limiting exposure to persons from all potential sources of radioactive material, including the groundwater source.
- The NRC staff concluded that there is no reason from the standpoint of protecting public health and safety to have a separate, lower criteria for one pathway as long as the dose from all pathways does not exceed the 25 mrem dose standard in the draft final rule.
- Further, the cost/benefit analysis provisions discussed earlier would also be applied to groundwater cleanup. This would require licensees to evaluate further remediation of groundwater at their sites especially for situations where relatively large populations could obtain their drinking water from the plume. It should be noted that such large populations are highly unlikely at most NRC licensed sites where groundwater may be affected.
- The NRC staff also believes that a limit on radiation exposure from all pathways at a decommissioned facility provides a uniform approach for protecting public health and safety making reliance on separate requirements for each pathway unnecessary. Furthermore, the current values in 40 CFR 141 are not uniformly protective since they can result in a wide range of doses for different radionuclides (e.g., less than 0.1 mrem per year to over 30 mrem per year), do not include all radionuclides (e.g. uranium), and at actual sites, have created significant technical and cost problems when applied to groundwater.
- In summary, the NRC staff approach will protect public health and safety through a rule that is clear, consistent, and can be

implemented in a practical manner.